Assignment 3: File systems

In this assignment, you need to execute Linux commands to manage a filesystem (WSL may also be possible for Windows users).

Problem 1:

Create a script called "`make_directory_loop.sh`" that creates a cycle of directories called dir1 and dir2. That is, after executing your make_directory_loop.sh from the current directory, the user will be able to do cd dir1/dir2/dir1/dir2/dir1/dir2.. indefinitely.

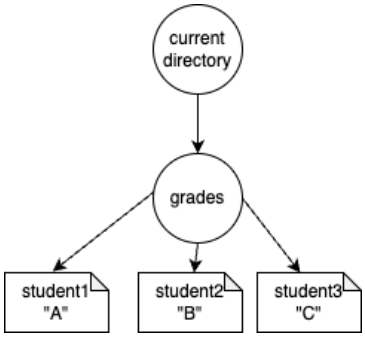
A script can be just a sequence of commands that you would write on the command line, you do not need to use conditions, loops, etc. (valid for all problems in this assignment)

Problem 2:

Create a script called "`make_links_to_file.sh`" that creates a file called *file1* in the current directory and three more links to that file. You can check if it is correctly created by executing the command "stat file1". In its second line in the output, it should appear "Links: 4"

Problem 3:

Create a script called "`make_course_grading_structure.sh`" that creates a folder structure like in the image below, with three files that contain a single character (an A, a B, or a C for student1, student2, and student3, respectively) and the following characteristics:



The course coordinator should be able to do anything in the "grades" folder: create new files, edit files, and remove files. The teaching assistants (ta) should be able to edit student1, student2, and student3 files, but not delete them or create new files. The students should only be able to read the grades (they must not be able to modify anything). Therefore, your script must also:

- create a user called "coordinator"
- create three teaching assistant users called "ta1", "ta2", and "ta3"
- create three student users called "student1", "student2", and "student3"
- give the appropriate permissions to each user, group, folder, and file.

Hints:

Hint 1: You can create and add content to a file with an `echo` command. For instance, to write an **A** grade in file *student1,* you can execute:

- `echo A > student1`

Hint 2: You can create users in a Linux system in a non-interactive way with the command:

```
sudo adduser --disabled-password --gecos automatic name_of_new_user
```

Hint 3: you can create groups in a Linux system with the command:

```
sudo groupadd name_of_new_group
```

Hint 4: you can add a user to a group with the command:

```
usermod -a -G name_of_group name_of_user
```

Hint 5: you can modify the group and owner of a file or directory with the commands:

- `sudo chgrp the_group_name the_file_or_folder_name`
- `sudo chown the_user_name the_file_or_folder_name`

Hint 6: you can change the permissions of a file with the `chmod` command. In that command, you can specify the permissions rwx as a number between 0 (000=--- no permissions) and 7 (binary 111=rwx permissions) for each classification owner|group|others. Example:

- `sudo chmod 0765 filename` → gives 7 (rwx) to the owner, 6 (rw-) to the group, and 5(r-x) to the others.

Hint 7: Command "`ln`" makes hard-links, and with option -s ("`ln -s`") it makes symbolic links

Hint 8: More info with examples about creating users and groups. https://www.pluralsight.com/blog/tutorials/linux-add-user-command

How to submit:

Create a .zip file that includes the three files requested (`make_directory_loop.sh`, `make_links_to_file.sh`, and `make_course_grading_structure.sh`) and the names.txt of the group members. If you go for the Excellent grade (explained in the next section), submit four files, an explanation, and the names.

For an Excellent:

The solution in Problem 3 allows any student to see the grades of any other student. To receive the Excellent in this assignment, you need to give more privacy to the student grades. Assuming that you can create any directory structure below the "*current directory,*" create a folder and file structure where:

- the coordinator can do anything with the files and folders;
- the TAs can write contents to the grades files, but they cannot delete the files;
- each student can read their grade file, but not the grade files of the other students.

Name the script that creates it "`make_course_grading_structure_private.sh`". Please add a document or image with an explanation of the expected folder structure (if it is faster for you, you can draw it on a piece of paper and take a picture).

Good luck!